

Claims

- [c1] 1. An energy absorbing structure, comprising:
a first deformation member having a curved shape with at least first and second opposing radii of curvature in the direction of a deformation axis; and
a second deformation member interconnected with said first deformation member such that said first and second deformation members intersect to define at least first and second deformation cavities between said deformation members, at least one of said deformation cavities operable to close during application of a load in the direction of said deformation axis.
- [c2] 2. The energy absorbing structure, as claimed in claim 1, wherein said first and second deformation members have a substantially identical shape.
- [c3] 3. The energy absorbing structure, as claimed in claim 1, wherein said first and second deformation members include a plurality of engagement slots, and wherein said engagement slots of said first deformation member slidably engage with said engagement slots of said second deformation member.

- [c4] 4. The energy absorbing structure, as claimed in claim 3, wherein said engagement slots are arranged to allow said first and second deformation members to substantially completely overlap.
- [c5] 5. The energy absorbing structure, as claimed in claim 1, wherein said first deformation cavity is operable to close upon the application of a first load in the direction of the deformation axis, and said first and second deformation cavities are operable to close upon the application of a second load in the direction of the deformation axis, wherein the second load is greater than the first load.
- [c6] 6. The energy absorbing structure, as claimed in claim 1, wherein said first and second deformation cavities are operable to close concurrently upon the application of a load.
- [c7] 7. The energy absorbing structure, as claimed in claim 1, wherein said first and second deformation members include a first flange along said first radius of curvature and a second flange along said second radius of curvature.
- [c8] 8. The energy absorbing structure, as claimed in claim 7, wherein a height of said first flange is greater than a height of said second flange.

- [c9] 9. The energy absorbing structure, as claimed in claim 8, wherein the height of said first and second flanges is selected based on load requirements for said deformation element.
- [c10] 10. The energy absorbing structure, as claimed in claim 1, wherein said first radius of curvature is greater than said second radius of curvature.
- [c11] 11. The energy absorbing structure, as claimed in claim 1, wherein said first radius of curvature is substantially equal to said second radius of curvature.
- [c12] 12. A deformation structure for use in a motor vehicle, comprising:
a first deformation member; and
a second deformation member,
wherein said first and second deformation members are interconnected such that an intersection of the members creates first and second deformation cavities arranged along a deformation axis, said deformation cavities operable to collapse during energy absorption along said deformation axis.
- [c13] 13. The deformation structure for use in a motor vehicle, as claimed in claim 12, wherein said first and second deformation members include a plurality of engagement

slots, and wherein said engagement slots of said first deformation member slidably engage with said engagement slots of said second deformation member.

[c14] 14. The deformation structure for use in a motor vehicle, as claimed in claim 13, wherein said engagement slots are arranged to allow said first and second deformation members to substantially completely overlap.

[c15] 15. The deformation structure for use in a motor vehicle, as claimed in claim 12, wherein the shape of said first and second deformation members is substantially identical.

[c16] 16. The deformation structure for use in a motor vehicle, as claimed in claim 12, wherein said first deformation cavity is operable to close upon the application of a first load in the direction of the deformation axis, and said first and second deformation cavities are operable to close upon the application of a second load in the direction of the deformation axis, wherein the second load is greater than the first load.

[c17] 17. The deformation structure for use in a motor vehicle, as claimed in claim 12, wherein said first and second deformation members include a first flange along a first curve and a second flange along a second curve.

- [c18] 18. The deformation structure for use in a motor vehicle, as claimed in claim 17, wherein a height of said first flange is greater than a height of said second flange.
- [c19] 19. The deformation structure for use in a motor vehicle, as claimed in claim 18, wherein the height of said first and second flanges is selected based on load requirements for said deformation element.
- [c20] 20. A deformation structure for use in a motor vehicle, comprising:
at least two deformation cavities having diamond-shaped cross sections formed by the intersection of two opposing deformation members, the deformation members having substantially identical shapes.
- [c21] 21. The deformation structure for use in a motor vehicle, as claimed in claim 20, wherein said two opposing deformation members include a plurality of engagement slots, and wherein said deformation member slidably engage with said engagement slots allowing said deformation members to substantially completely overlap.
- [c22] 22. The deformation structure for use in a motor vehicle, as claimed in claim 20, wherein said deformation structure includes a first deformation cavity and a second deformation cavity, and wherein said first deformation cav-

ity is operable to close upon the application of a first load in the direction of a deformation axis, and said second deformation cavity is operable to close upon the application of a second load in the direction of the deformation axis, wherein the second load is greater than the first load.

[c23] 23. The deformation structure for use in a motor vehicle, as claimed in claim 20, wherein said deformation members include at least first and second flanges arranged along a perimeter of said deformation cavities.

[c24] 24. The deformation structure for use in a motor vehicle, as claimed in claim 23, wherein a height of said first flange is greater than a height of said second flange.

[c25] 25. The deformation structure for use in a motor vehicle, as claimed in claim 24, wherein the height of said first and second flanges is selected based on load requirements for said deformation structure.

[c26] 26. A deformation structure for use in a motor vehicle, comprising:
a first deformation member having a curved shape with at least first and second opposing radii of curvature in the direction of a deformation axis;
a second deformation member having a substantially

identical shape as said first deformation member; and means for interlocking said first and second deformation members to create at least first and second deformation cavities.

- [c27] 27. The deformation structure for use in a motor vehicle, as claimed in claim 26, wherein said means for interlocking include a plurality of engagement slots.
- [c28] 28. The deformation structure for use in a motor vehicle, as claimed in claim 26, wherein said first deformation cavity is larger than said second deformation cavity.
- [c29] 29. The deformation structure for use in a motor vehicle, as claimed in claim 26, wherein said first radius of curvature is greater than said second radius of curvature.
- [c30] 30. The deformation structure for use in a motor vehicle, as claimed in claim 26, wherein said first radius of curvature is substantially equal to said second radius of curvature.